

CLAIMS

TOP SECRET - 172700

1. Hydrophobic polymers incompatible with starch containing, as a filler, a starch complex dispersed in the hydrophobic polymeric matrix in the form of particles with a numeral average size of less than 3 microns, bound to the polymer matrix by means of coupling agents containing groups compatible with the matrix and with the starch complex or by means of reactive groups present in the starch-complex capable of being fixed to the polymeric matrix, wherein the starch complex is characterized by a second-derivative IR absorption in the region of 940-950 cm^{-1} , and the starch complex, in the case of hydrophobic biodegradable polymers selected from the group consisting of the aliphatic or aliphatic-aromatic polyesters, the aliphatic polyamides, polyamides-polyesters, polyurethane polyesters, polyurethane-polyamides, polyurea-polyesters is a complex of starch with a polymer different from the polymer forming the matrix and from ethylene-vinylalcohol copolymers or with other complexing agents.

2. Polymers according to Claim 1, in which the starch complex is dispersed in the form of particles having a numeral average size of less than 1 micron.

sub A, > 3. Polymers according to Claims 1 or 2, wherein the coupling agent is selected from the group consisting of a vinyl silane, an alkyl titanate, and bis-3-triethoxysilylpropyl tetrasulphide.

4. Polymers according to Claims 1 or 2, wherein the complexing agent different from the polymer forming the

polymeric matrix is selected from the group consisting of polylactic acid, polyglycolic acid, poly(lactic-glycolic) acid copolymers, ethylene-acrylic acid copolymers, ethylene-vinylacetate copolymers.

5. Polymers according to any of Claims 1 to 4, in which the quantity of filler comprising the complex dispersed in the hydrophobic polymer is from 0.5 to 50% by weight.

6. Polymers according to any of Claims 1 to 5, in which the starch complexes are produced from compositions of starch with polymers compatible with starch containing lyophilic groups and lyophobic sequences, wherein the starch complex is present and from which a micro-dispersion of particles with numeral average diameters of less than 1 micron is formed by treatment in water at 100°C under stirring.

7. Polymers according to any of Claims 1 to 6, produced with the use of compositions having a water content of less than 20%, and higher than 2% by weight, and a Tg below 0°C.

8. Polymers according to Claim 6, in which the polymer which can form complexes with starch is selected from the group comprising copolymers of ethylene with polar monomers.

9. Polymers according to Claim 8, in which the copolymer is selected from the group comprising copolymers of ethylene with vinyl alcohol, vinyl acetate and acrylic acid.

SEARCHED
INDEXED
SERIALIZED
FILED

10. Polymers according to Claim 9, in which the ethylene/vinyl alcohol copolymer contains from 50 to 75% of vinyl alcohol in moles.

Sub
A₂ >

11. Polymers according to Claim 6, in which the polymer which can complex with the starch is selected from copolymers of polyester/polyurethane, polyamide/polyester, aliphatic and aliphatic aromatic polyesters and polyamides.

12. Polymers according to any of Claims 1 to 11, in which the hydrophobic polymer incompatible with starch is selected from the group consisting of ethylene polymers and copolymers, crystalline propylene polymers and copolymers, aromatic polyester resins, polyamides, polyoxymethylene resins, polyphenylene oxide resins, and polycarbonates.

13. Polymers according to any of Claims 1 to 11, in which the hydrophobic polymer is a rubber selected from the group consisting of styrene-butadiene rubbers, polybutadiene rubbers, polyisoprene rubbers, ethylene-propylene and ethylene-propylene-diene rubbers, and natural rubber.

14. A method for preparing filled polymers according to any of Claims 1 to 13, in which a composition comprising the starch/polymer complex, forming part of a continuous interpenetrated structure between the complexing polymer and the complex is mixed, in the melt state or under hot mastication conditions, with the hydrophobic polymer incompatible with starch, in the presence of coupling agents containing groups reactive with the polymer matrix and with the complex.

FOURTY-EIGHT

15. A method of preparing filled polymers according to any of Claims 1 to 13, in which a composition comprising the starch/polymer complex is mixed with a rubber at a processing temperature between 140 and 160C, in the presence of coupling agents containing groups reactive with the polymer matrix and with the complex.

16. A method according to Claim 14 and 15, in which the coupling agent is selected from vinyl and tetrasulphide silanes and alkyl titanates.

17. A method according to any of claims 14, 15 and 16 in which the coupling agent is used in a quantity of from 0.05 to 10% by weight of the complex.

18. A method for preparing filled polymers according to Claims 1 to 13, wherein the polymeric matrix is a biodegradable polymer selected from the group consisting of the aliphatic-aromatic polyesters, the aliphatic polyamides, the polyamides-polyesters, polyurethane-polyesters, polyurethane-polyamides and poliurea-polyesters comprising melt-mixing the polymer forming the polymeric matrix with a complex of starch having the characteristics as set forth in claim 1 and further characterized by being formed of starch complexed with a polymer different from the polymer forming the matrix and from the ethylene-vinylalcohol copolymers or with other complexing agents.

19. A method according to claim 18, wherein the starch complex is preformed or formed during melt-mixing.

T85160 "TE828250

20. Shaped articles obtainable from the hydrophobic polymers of claim 1 to 13.

Sub A₃ > 21. Shaped articles obtainable from the hydrophobic polymers of claims 1 to 13, wherein the hydrophobic polymer is selected from the group consisting of the aliphatic and aliphatic-aromatic polyesters, polyurethane-polyamides, polyurea-polyesters, and polyurethane-polyesters.

22. Films and compostable bags obtainable from the hydrophobic polymers of claims 1 to 13.

23. Tyres obtainable from the rubbers of claim 13.

0163-0337(199203)32:1;1-0